

Student Name

Mathematics Stage 4

RATIOS AND RATES

Book 1 Recognise and simplify ratios

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OVERVIEW

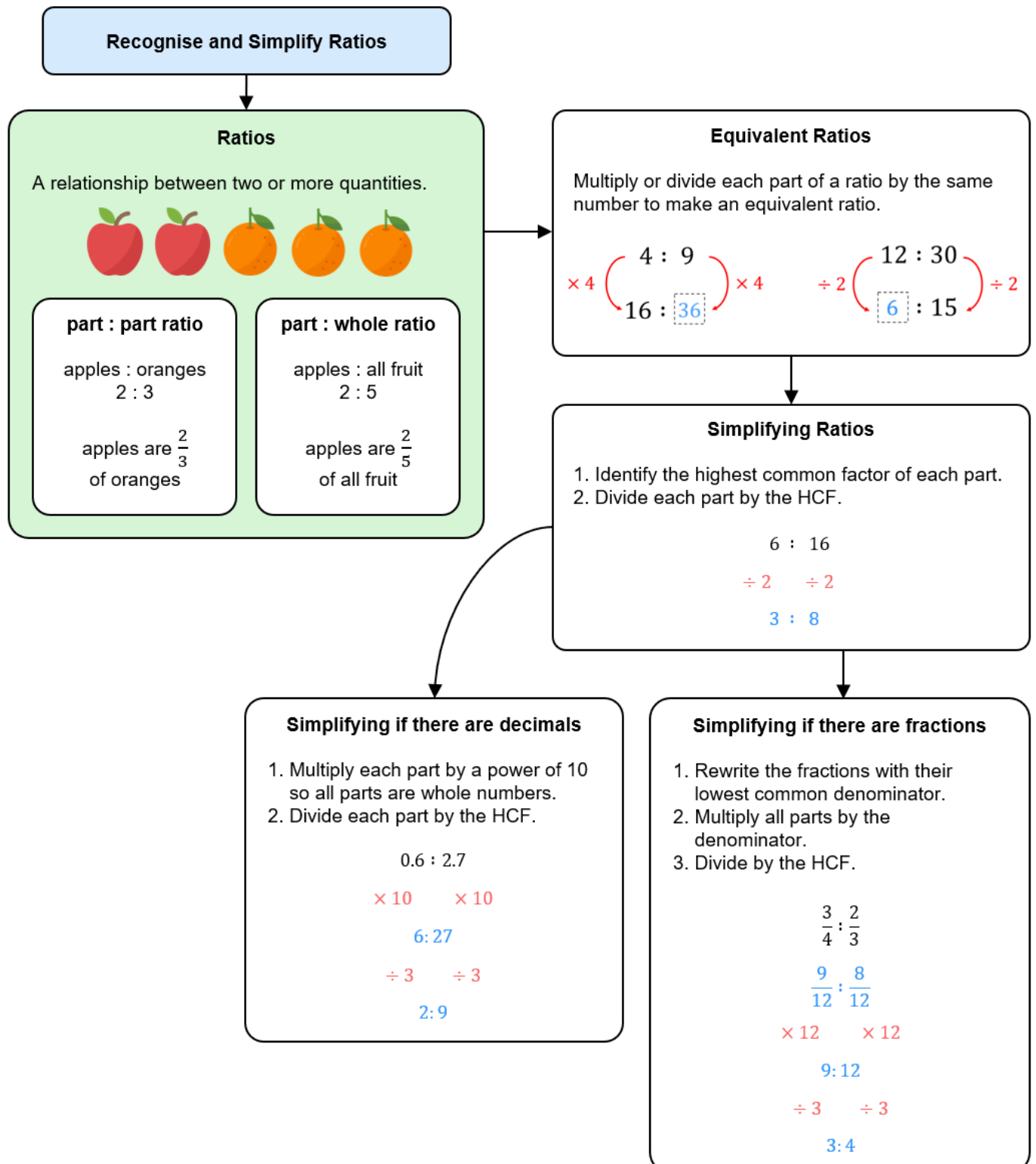
SYLLABUS CONTENT

MA4-RAT-C-01 solves problems involving ratios and rates, and analyses distance–time graphs

Recognise and simplify ratios

- Use ratios to compare 2 or more quantities measured in the same units
- Identify and express one part of a ratio as a fraction of the whole
- Simplify ratios

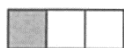
SUMMARY



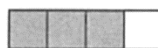
REVIEW OF PRIOR KNOWLEDGE

1 What fraction of each bar model is shaded?

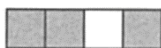
a



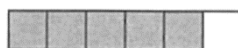
b



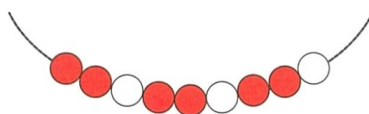
c



d



2 This necklace is made up of coloured beads and white beads.



Determine whether these statements are true or false:

a For every 6 coloured beads, there are 3 white beads.

b For every 2 coloured beads, there are 1 white bead.

c For every 1 white bead, there are 2 coloured beads

d For every 2 white beads, there is 1 coloured bead.

3 Write the equivalent fraction.

a $\frac{1}{5} = \frac{\square}{10}$

b $\frac{1}{5} = \frac{\square}{100}$

c $\frac{2}{5} = \frac{4}{\square}$

d $\frac{3}{4} = \frac{\square}{40}$

e $\frac{2}{3} = \frac{12}{\square}$

f $\frac{3}{2} = \frac{6}{\square}$

g $\frac{15}{10} = \frac{\square}{2}$

h $\frac{90}{100} = \frac{\square}{10}$

4 Identify the highest common factor (HCF) of these numbers:

a 12 and 16

b 18 and 27

c 250 and 100

d 16 and 72

e 48 and 32

f 75 and 25

5 Simplify these fractions.

a

$$\frac{9}{24}$$

b

$$\frac{32}{16}$$

c

$$\frac{120}{144}$$

d

$$\frac{700}{140}$$

REPRESENTING RATIOS

RATIOS

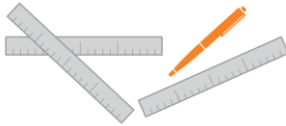
- A **ratio** is a relationship between two or more quantities.
- Example: 2 apples for every 3 oranges.
The ratio of apples to oranges is 2 to 3.
apples : oranges = 2 : 3



- Part : part ratio** compares two parts of a whole.
- Part : whole ratio** compares a part to the whole.

Part : Part	Part : Whole
apples : oranges 2 : 3	apples : all fruit 2 : 5

Example Compare two quantities using ratios.

Write the ratio for:		Does the order of the numbers in a ratio matter? , the first number represents the quantity of the first item, and the second number represents the quantity of the second item.
Pens to rulers	1 : 3	
Rulers to pens	3 : 1	
Rulers to all stationery	3 : 4	

Compare these quantities using ratios.

a



Circles to triangles

Triangles to circles.

Triangles to all shapes

2 : 5

5 : 2

5 : 7

b



Circles to squares

Triangles to circles.

Triangles to all shapes

2 : 3

2 : 2

2 : 7

Key ideas

- A ratio shows a relationship between two
- A ratio can relate two, or relate a part to the whole.
- The ratio 3:7 is read as: "three seven."
- 3:7 is to 7:3.

RATIOS AS FRACTIONS



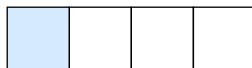
Part : Part	Part : Whole
apples : oranges	apples : all fruit
2 : 3	2 : 5
apples are $\frac{2}{3}$ of oranges	apples are $\frac{2}{5}$ of all fruit

Example Represent a ratio as a fraction.

Write:		What is the difference between part:part and part:whole?
		<i>part:part compares a part to another</i>
Shaded to unshaded as a ratio:	1:2	<i>part:whole compares a part to the</i>
Shaded to unshaded as a fraction:	$\frac{1}{2}$	True or false? A fraction always represents parts of a whole.
Shaded to all squares as a ratio:	1:3	<i>....., a fraction can also represent a</i>
Shaded as a fraction of the whole:	$\frac{1}{3}$	<i>part:part ratio.</i>

Compare these quantities using fractions.

a



Shaded to unshaded as a ratio:

1 : 3

Shaded to unshaded as a fraction:

$\frac{1}{3}$

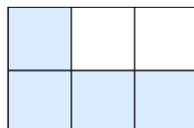
Shaded to the whole as a ratio:

1 : 4

Shaded to the whole as a fraction:

$\frac{1}{4}$

b



Shaded to unshaded as a ratio:

4 : 2

Shaded to unshaded as a fraction:

$\frac{2}{1}$

Shaded to the whole as a ratio:

4 : 6

Shaded to the whole as a fraction:

$\frac{2}{3}$

c



Shaded to unshaded as a ratio:

3 : 3

Shaded to unshaded as a fraction:

1

Shaded to the whole as a ratio:

3 : 6

Shaded to the whole as a fraction:

$\frac{1}{2}$

Key ideas

- If there are 7 apples to 9 oranges, we can express the number of apples as a fraction of the whole as

1 Compare these quantities using ratio notation.

a



Squares : Triangles

:

3:2

Triangles : Squares

:

2:3

Triangles : Shapes

:

2:5

Squares : Shapes

:

3:5

b



Carrots : Potatoes

:

6:7

Potatoes : Carrots

:

7:6

Carrots : Vegetables

:

6:13

Potatoes : Vegetables

:

7:13

c



Circles : Squares

:

6:5

Squares : Circles

:

5:6

Circles : Total

:

6:11

Squares : Total

:

5:11

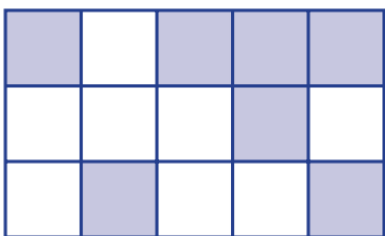
Circles is of the total.

Squares is of the total.

$\frac{6}{11}$

$\frac{5}{11}$

d



Shaded : Unshaded

:

7:8

Unshaded : Shaded

:

8:7

Shaded : Total

:

7:15

Unshaded : Total

:

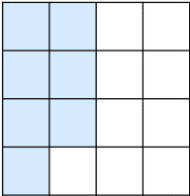
8:15

Shaded is of the total.

Unshaded is of the total.

$\frac{7}{15}$

$\frac{8}{15}$

- 2** There are 3 apples and 4 bananas in a bowl.
- a** What fraction of the total are bananas? $\frac{4}{7}$
- b** What is the ratio of bananas to apples? 4:3
- c** What is the ratio of apples to total fruits? 3:7
- 3** A box contains 5 green and 7 red marbles.
- a** Write the ratio of green marbles to red marbles. 5:7
- b** What is the total number of marbles? 12
- c** What fraction of the marbles are green? $\frac{5}{12}$
- 4** Over 14 days, it rained on 8 days, snowed on 3 days, and was fine the rest. Write the ratio of:
- | | |
|------------------------------------|--|
| a Rainy days to snowy days. | b Snowy days to total days. |
| $8:3$ | $3:14$ |
| c Fine days to rainy days. | d Fine days as a fraction of the fortnight. |
| $3:8$ | $\frac{3}{14}$ |
- 5** Consider the diagram.
- 

a What is the ratio of shaded : unshaded? 7:9

b Emily says the shaded parts as a fraction of the whole is $\frac{7}{9}$.
Explain why she is incorrect.
- The part to whole ratio would be 7:16 or $\frac{7}{16}$
- 6** The fraction of a class that are boys is $\frac{3}{5}$.
- a** What fraction of the class are girls? $\frac{2}{5}$
- b** Eddie says that the ratio of boys to girls is 3: 5.
Explain why he is incorrect and state the correct ratio of boys to girls.

3:5 is the ratio of boys to all students. The ratio of boys to girls is 3:2.

- 7 The ratio of red to green is 2 : 3.



a Green is $\frac{\square}{\square}$ of the total.

$\frac{3}{5}$

b Red is $\frac{\square}{\square}$ of green.

$\frac{2}{3}$

c Green is $\frac{\square}{\square}$ of red.

$\frac{3}{2}$

- 8 Convert between these ratios and fractions.

a The ratio of $a : b$ is 3 : 2

a is $\frac{\square}{\square}$ of the total.

$\frac{3}{5}$

b The ratio of $a : b$ is 3 : 2

b is $\frac{\square}{\square}$ of the total.

$\frac{2}{5}$

c The ratio of $a : b$ is 3 : 1

b is $\frac{\square}{\square}$ of the total.

$\frac{1}{4}$

d The ratio of $a : b$ is 3 : 2

b is $\frac{\square}{\square}$ of a .

$\frac{2}{3}$

e The ratio of $a : b$ is 4 : 1

b is $\frac{\square}{\square}$ of a .

$\frac{1}{4}$

f The ratio of $a : b$ is 4 : 1

a is $\frac{\square}{\square}$ of b .

$\frac{4}{1}$ or 4

g The ratio of $a : b$ is 8 : 2

a is $\frac{\square}{\square}$ of b .

$\frac{8}{2}$ or 4

h The ratio of $a : b$ is 2 : 8

a is $\frac{\square}{\square}$ of b .

$\frac{2}{8}$ or $\frac{1}{4}$

i The ratio of $a : b$ is 3 : 9

a is $\frac{\square}{\square}$ of b .

$\frac{3}{9}$ or $\frac{1}{3}$

j The ratio of $a : b$ is 3 : 10

a is $\frac{\square}{\square}$ of b .

$\frac{3}{10}$

k The ratio of $a : b$ is 3 : 10

b is $\frac{\square}{\square}$ of a .

$\frac{10}{3}$

l The ratio of $a : b$ is 3 : 10

a is $\frac{\square}{\square}$ of the total.

$\frac{3}{13}$

m The ratio of $a : b$ is 3 : 10

b is $\frac{\square}{\square}$ of the total.

$\frac{10}{13}$

n The ratio of $a : b$ is 10 : 3

b is $\frac{\square}{\square}$ of the total.

$\frac{3}{13}$

- 9 Jacob is making a drink using cordial and water.
For every one part cordial, he uses four parts water.
- a Write the ratio of cordial to water.

1:4

- b Jacob makes a second drink using cordial to water in the ratio 1:5.
Will this drink be stronger or weaker than his first drink?

weaker, as there are more parts of water for each part of cordial.

- c Which of these ratios of cordial to water will make the strongest drink?
Explain your answer.

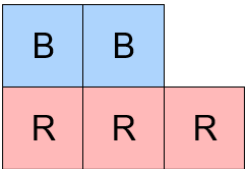
1:5 2:5 2:3 3:10

2:3, by converting all four ratios to fractions, $\frac{2}{3}$ is the largest fraction out of the three.

- d Jenny says that there must also be more of the second drink compared to the first drink.
Explain why she is not correct.

a ratio tells you nothing about the total amount, only one amount related to the other.

- 10 Classify these statements true or false.



- a $\frac{2}{3}$ of the squares are blue.

false

- b $\frac{3}{5}$ of the squares are red.

true

- c The number of blue squares is $\frac{2}{3}$ of the number of red.

true

- d The number of red squares is $\frac{3}{2}$ of the number of blue.

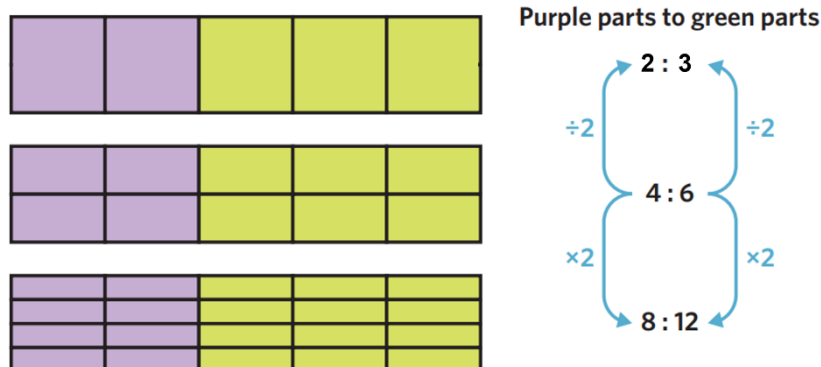
true

- e The ratio of red squares to the total number of squares is 3: 5.

true

EQUIVALENT RATIOS

- **Equivalent** ratios show the same relationship between two quantities.
- To make **equivalent ratios**, **multiply** or **divide** all parts by the same number.



Example Produce equivalent ratios.

$4 : 9$ $16 : \square$	$\times 4 \left(\begin{array}{c} 4 : 9 \\ 16 : \boxed{36} \end{array} \right) \times 4$	How is producing equivalent ratios similar to equivalent fractions? <i>To make equivalent fractions, we multiply or divide the and</i> <i>To make equivalent ratios, we multiply or divide numbers in the ratio.</i>
$12 : 30$ $\square : 15$	$\div 2 \left(\begin{array}{c} 12 : 30 \\ \boxed{6} : 15 \end{array} \right) \div 2$	

Produce equivalent ratios.

a	$1 : 3$ $5 : \dots$	b	$9 : 10$ $27 : \dots$
c	$2 : 9$ $\dots : 18$	d	$20 : 32$ $\dots : 8$
e	$12 : 15$ $4 : \dots$	f	$35 : 14$ $\dots : 2$

Key ideas

1. ratios represent the same relationship between two numbers.
2. To find equivalent ratios, or the two parts of the ratio by the same number.

1 Produce these equivalent ratios.

a



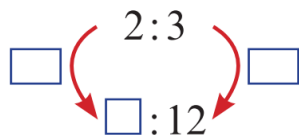
b



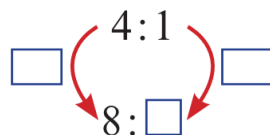
c



d



e



f

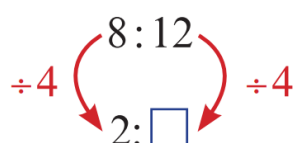


2 Produce these equivalent ratios.

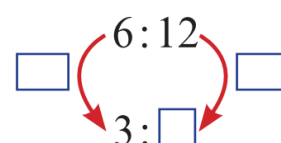
a



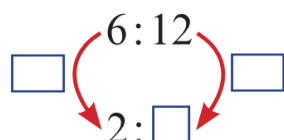
b



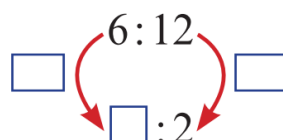
c



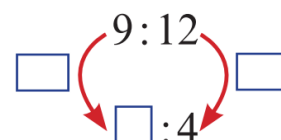
d



e



f



3 Darius thinks the ratio 2:3 is the same as the ratio 1:2, as the numbers have both been increased by 1.

a Explain why Darius is wrong.

.....

b Find a ratio that is the same as 2:3

.....

4 Complete each equivalent ratio.

a

$$2:3 = 8: \underline{\hspace{2cm}}$$

b

$$1:5 = 2: \underline{\hspace{2cm}}$$

c

$$3:5 = \underline{\hspace{2cm}}:15$$

d

$$5:11 = \underline{\hspace{2cm}}:66$$

e

$$3:4 = \underline{\hspace{2cm}}:100$$

f

$$2:1 = 10: \underline{\hspace{2cm}}$$

g

$$\underline{\hspace{2cm}}:9 = 20:36$$

h

$$12: \underline{\hspace{2cm}} = 3:1$$

i

$$17:34 = \underline{\hspace{2cm}}:2$$

j

$$\underline{\hspace{2cm}}:20 = 15:60$$

k

$$24:20 = 6: \underline{\hspace{2cm}}$$

l

$$50:40 = \underline{\hspace{2cm}}:20$$

SIMPLIFYING RATIOS

- A **simplified** ratio has **no common factors** shared between the numbers in the ratio.
- To simplify a ratio:
 1. Identify the **highest common factor (HCF)** of all the parts.
 2. Divide each part by the HCF.

Example Simplify ratios.

$6 : 16$ $\div 2 \quad \div 2$ $3 : 8$	How do you know what to divide by when simplifying ratios? <i>To simplify ratios, we divide both parts by their h..... c..... f.....</i>
--	--

Simplify these ratios.

a 20:45	b 42:66	c 16:40	d 50:75
4:9	7:11	2:5	2:3

- A ratio must use the **same units**.
- To simplify a ratio, first convert all units to the same.
- **Convert to the smaller unit** to avoid decimals.

Example Simplify ratios with different units.

$18 \text{ mm} : 6 \text{ cm}$ $18 \text{ mm} : 60 \text{ mm}$ $\div 6 \quad \div 6$ $3 : 10$	$\$2 : 50 \text{ c}$ $200 \text{ c} : 50 \text{ c}$ $\div 50 \quad \div 50$ $4 : 1$
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Simplify these ratios.

a 24 mm : 3 cm	b 2.5 km : 500 m	c \$3.50 : 30 c	d 45 min : 2 hours
4:5	5:1	35:3	3:8

Key ideas

1. To simplify ratios, both parts of the ratio by the
2. The of both parts of the ratio should be the same before you simplify.

1 Write the ratios in simplest form, using the visual models. Show the operation you do to both parts of the ratio.

a

3:12

:

:

1:4

b

4:10

:

:

2:5

2 Simplify these ratios.

a

3 : 6

:

÷3

÷3

:

1:2

b

12 : 18

:

÷

÷

:

2 : 3

÷ 6

c

16 : 20

:

÷

÷

:

÷ 4, 4:5

3 Write the ratios of the shaded to unshaded parts for these diagrams, then simplify the ratio to simplest form.

a

:

:

2:1

b

:

:

1:1

c

:

:

2:1

d

:

:

2:1

4 Simplify these ratios.

a 10 : 50 1:5	b 8 : 10 4:5	c 21 : 28 3:4	d 18 : 14 9:7
e 45 : 35 9:7	f 51 : 17 3:1	g 145 : 45 29:9	h 200 : 125 8:5

5

a Simplify 120 : 300

2:5

b Simplify $\frac{120}{300}$ $\frac{2}{5}$ c What is the same about your methods for **a** and **b**?

Divide both numbers by the HCF.

6 Kim was absent from school on 8 days in Term one. There were 44 school days in term one. Write the following ratios in simplest form.

a days absent to total days	b days present to total	c absent days to present
-----------------------------	-------------------------	--------------------------

2:11

9:11

2:9

d complete the sentence: for every 9 days she is present, Kim is absent days.

7 For every \$1 Ali has, Cathy has 50 cents.

a Explain why the ratio of Ali's money to Cathy's is **not** 1:50.

the units are different.

b What would the ratio of Ali's money to Cathy's be, in simplest form?

2:1

8 Ratios always have the same units.

Simplify the ratios by first changing the quantities to the same units first.

a 12 mm to 3 cm	b 120 m to 1 km	c 3 kg to 450 g	d 400 mL to 1 L
-----------------	-----------------	-----------------	-----------------

12 mm : 30 mm

..... :

2:5

3:25

20:3

2:5

e 3 hours to 15 minutes	f 180 minutes to 2 hours	g 50 cents to \$5
-------------------------	--------------------------	-------------------

12:1

3:2

1:10

9 Fred incorrectly simplified 12 cm to 3 mm as the ratio 4:1.
Explain his mistake and what is the correct answer?

The units are different. The correct answer is 40:1.

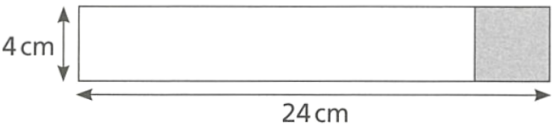
10 Ratios can compare three quantities. Simplify the following by dividing each part by the HCF.

a	8 : 12 : 20	b	15 : 20 : 30	c	27 : 9 : 36
d	12 : 21 : 33	e	12 : 24 : 36	f	270 : 420 : 60
	2:3:5		3:4:6		3:1:4
	4:7:11		1:2:3		9:14:2

11 Ratios always have the same units. Convert units to be the same then simplify.

a	80c : \$8	b	90c : \$4.50	c	80 cm : 1.2 m
d	0.7 kg : 800 g	e	2.5 kg : 400 g	f	30 min : 2 hours
	1:10		1:5		2:3
g	45 min : 3 hours	h	4 hours : 50 min	i	40 cm : 2 m : 50 cm
	7:8		25:4		1:4
	1:4		24:5		4:20:5

12 The shaded part of the rectangle is a square.
What is the ratio of the white area to the shaded area, in simplest form?



5:1

11 Find the value of x in each case.

a $2x:3 = 4:1$	b $2x:3 = 5:1$	c $2x:3 = 6:1$
$x = 6$	$x = 7.5$	$x = 9$
d $2x:6 = 6:1$	e $4x:6 = 6:1$	f $4x:6 = 3:1$
$x = 18$	$x = 9$	$x = 4.5$
g $(4x - 6):6 = 3:1$	h $(4x + 6):6 = 3:1$	i $(4x + 6):6 = 2:1$
$x = 6$	$x = 3$	$x = 1.5$
j $(4x + 6):(x + 24) = 1:1$	k $(2x + 3):(x + 24) = 1:2$	l $(2x + 4):(x + 4) = 1:2$
$x = 6$	$x = 6$	$x = -\frac{4}{3}$

SIMPLIFYING RATIOS INVOLVING FRACTIONS AND DECIMALS

- A **fully simplified** ratio has **no fractions** and **no decimals**.
- **If there are decimals:**
 1. Multiply each part by a power of 10 to get whole numbers.
 2. Divide by the highest common factor.
- **If there are fractions:**
 1. Rewrite the fractions with their lowest common denominator.
 2. Multiply by the denominator.

Example Simplify ratios with fractions and decimals.

$ \begin{array}{c} 0.6 : 2.7 \\ \times 10 \quad \times 10 \\ 6 : 27 \\ \div 3 \quad \div 3 \\ 2 : 9 \end{array} $	How do you simplify ratios involving decimals? <i>First, multiply by a power of so both parts are numbers.</i> <i>Then, both parts by the</i>
$ \begin{array}{c} \frac{3}{4} : \frac{2}{3} \\ \frac{9}{12} : \frac{8}{12} \\ \times 12 \quad \times 12 \\ 9 : 12 \\ \div 3 \quad \div 3 \\ 3 : 4 \end{array} $	How do you simplify ratios involving fractions? <i>First, change the to the lowest common multiple.</i> <i>Then, both numbers by the denominator.</i>

Simplify these ratios.

a $2.2 : 3.3$

$2 : 3$

b $1.05 : 5.5$

$21 : 110$

c $\frac{4}{5} : \frac{2}{3}$

$6 : 5$

d $\frac{2}{3} : \frac{5}{6}$

$4 : 5$

Key ideas

1. Simplified ratios have no fractions or

1 Simplify these ratios involving decimals.

a $0.2 : 3 : 0.8$

$$= \overset{\times 10}{\boxed{2}} : \overset{\times 10}{\boxed{30}} : \overset{\times 10}{\boxed{8}} = \boxed{1} : \boxed{15} : \boxed{4}$$

Rewrite - no decimals Simplify

b $0.6 : 0.09 : 3$

$$= \boxed{} : \boxed{} : \boxed{} = \boxed{} : \boxed{} : \boxed{}$$

Remove decimals ($\times 100$) Simplify

20:3:100

c $2.2 : 4 : 1.05$

$$= \boxed{} : \boxed{} : \boxed{} = \boxed{} : \boxed{} : \boxed{}$$

44:80:21

d $0.04 : 0.008 : 0.1$

$$= \boxed{} : \boxed{} : \boxed{} = \boxed{} : \boxed{} : \boxed{}$$

10:2:25

e $0.8 : 2 : 0.16$

$$= \boxed{} : \boxed{} : \boxed{} = \boxed{} : \boxed{} : \boxed{}$$

10:25:2

f $0.7 : 2.1 : 0.35$

$$= \boxed{} : \boxed{} : \boxed{} = \boxed{} : \boxed{} : \boxed{}$$

2:6:1

2 Simplify these ratios involving fractions.

a $\frac{1}{2} : \frac{2}{3} = \frac{\boxed{3}}{\boxed{6}} : \frac{\boxed{4}}{\boxed{6}} = \boxed{3} : \boxed{4}$

3:4

b $\frac{3}{4} : \frac{1}{3} = \frac{\boxed{}}{\boxed{12}} : \frac{\boxed{}}{\boxed{12}} = \boxed{} : \boxed{}$

9:4

c $\frac{3}{5} : \frac{7}{10} = \frac{\boxed{}}{\boxed{10}} : \frac{\boxed{}}{\boxed{10}} = \boxed{} : \boxed{}$

6:7

d $\frac{1}{4} : \frac{2}{5} = \frac{\boxed{}}{\boxed{}} : \frac{\boxed{}}{\boxed{}} = \boxed{} : \boxed{}$

5:8

e $\frac{3}{8} : \frac{5}{6} =$

9:20

f $\frac{3}{4} : \frac{1}{2} : \frac{2}{3}$

9:6:8

g $3\frac{1}{2} : \frac{2}{5} : \frac{9}{10} = \frac{\boxed{}}{\boxed{}} : \frac{\boxed{}}{\boxed{}} : \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} : \frac{\boxed{}}{\boxed{}} : \frac{\boxed{}}{\boxed{}} = \boxed{} : \boxed{} : \boxed{}$

Change mixed numerals to improper fractions first

35:4:9

h $2\frac{3}{4} : \frac{1}{3} : 1\frac{5}{6}$

33:4:22

3 Simplify these ratios.

a $10 : 16$

5:8

b $16 : 10$

8:5

c $8 : 10$

4:5

d $4 : 5$

4:5

e $4.5 : 5$

9:10

f $32 : 24$

4:3

g $32 : 48$

2:3

h $64 : 96$

2:3

i $64 : 96 : 20$

16:24:5

j $128 : 96 : 20$

32:24:5

k $15 : 10$

3:2

l $150 : 200$

3:4

m $3 : 2$

3:2

n $24 : 8$

3:1

o $80 : 240$

1:3

p $0.8 : 2.4$

1:3

q $\frac{8}{10} : \frac{24}{10}$

1:3

r $8x : 24x$

1:3

s $8 : 24 : 32$

1:3:4

t $0.5 : 1.5 : 2$

1:3:4

4 Sometimes ratios are more useful simplified to the form $1:n$; we divide both parts by the value of the first part. Express these ratios in the form $1:n$. Leave numbers as decimals.

a $10 : 35$

$\div 10 \quad \div 10$

$1 : \dots\dots$

1:3.5

b $40 : 72$

$\div 40 \quad \div 40$

1:1.8

c $24 : 60$

1:2.4

d $80 : 72$

1:0.9

e $50 : 87$

1:1.74

f $90 : 40$

1:0.4

g $60 : 48$

1:0.8

h $8 : 125$

1:15.625

i 1 cm to 1 m

1:100

j 1 mm to 1 m

1:1000

k 20 mL to 1 L

1:50

l 50 mg to 15 g

1:300

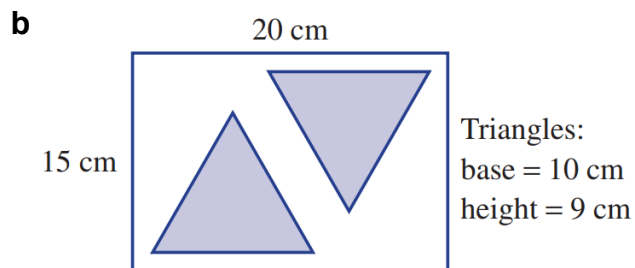
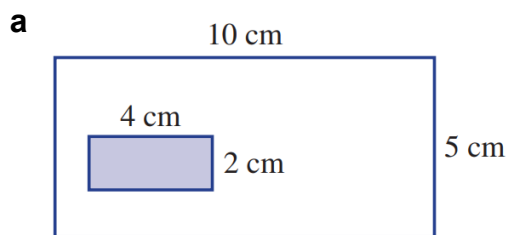
5 Simplify these ratios.

a 25 : 35	b 100 : 28 : 4	c 1.6 : 1.9	d 0.93 : 0.6
5 : 7	25 : 7 : 1	16 : 19	31 : 20
e $\frac{3}{2} : 2\frac{1}{2}$	f 2.2 kg : 850 g	g 6 min : 2.1 h	h $\frac{1}{2} : \frac{1}{3}$
3 : 5	44 : 17	1 : 21	3 : 2
i 25 cm : 1.1 m	j \$1.50 : 80 c	k 600 mL : 1.5 L	l $\frac{5}{8} : \frac{2}{3}$
5 : 22	15 : 8	2 : 5	15 : 16

6 Simplify these ratios by converting all units to be the same first.

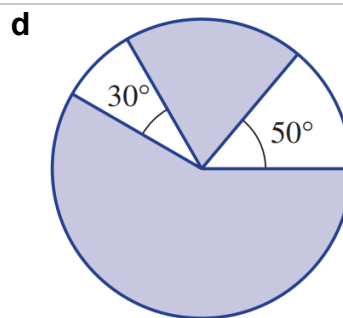
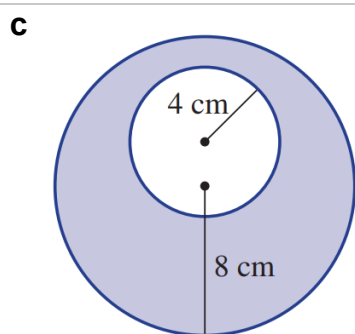
a 15 cm : 0.6 m : 30 mm	b 2 m : 45 s : 1 m 25 s	c 1.2 kg : 800 g : 0.4 kg
5 : 20 : 1	24 : 9 : 17	3 : 2 : 1
d 600 L : 4.2 kL : 0.9 kL	e \$3.60 : 45 c : \$2.07	f 3 weeks : 1 fortnight
2 : 14 : 3	40 : 5 : 23	3 : 2
g 6000 mg : 12 g : 0.06 kg	h 10 cm ² : 200 mm ²	i 600 m ² : 1 ha
1 : 2 : 10	5 : 1	3 : 50

- 7 Using the dimensions provided, find the ratio of the shaded area to the unshaded area for each of the following diagrams. (Hint: for the circles, leave your answer in terms of π).



4 : 21

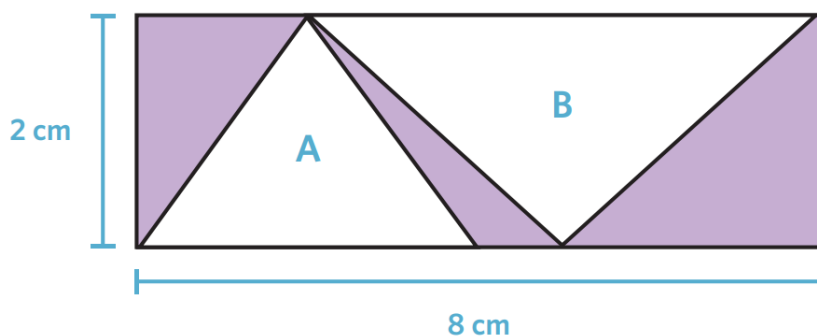
3 : 7



3 : 1

7 : 2

- 8 In the diagram below:
The base of triangle A is half the length of the rectangle.
The base of triangle B is three quarters of the length of the rectangle.



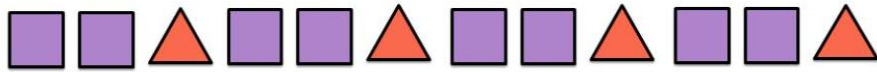
Find the ratio of the unshaded area to the shaded area.

5 : 3

CHECK YOUR UNDERSTANDING

Representing ratios

- 1 For every 2 triangles, there are squares.



- a 2 b 8 c 5 d 4

- 2 What is the ratio of triangles to squares?



- a 3 : 7 b 3 : 4 c 4 : 3 d 7 : 3

- 3 A drink is made of yoghurt and water in the ratio 5 : 1. What fraction of the drink is water?

- a $\frac{1}{5}$ b $\frac{5}{6}$ c $\frac{1}{6}$ d Not enough information

- 4 James pauses a film with one seventh left to watch. What is the ratio of watched to unwatched?

- a 1 : 7 b 7 : 1 c 6 : 1 d 1 : 6

- 5 Bhav and Henry share some money. Bhav gets five times as much as Henry. What fraction of the money does Henry get?

- a $\frac{1}{5}$ b $\frac{1}{6}$ c $\frac{5}{6}$ d $\frac{4}{5}$

Simplifying ratios

1	Simplify 9 : 12	a	1 : 4	b	3 : 4	c	3.5 : 6	d	1 : 3
2	Simplify 12 : 18	a	6 : 9	b	1 : 4	c	1 : 2	d	2 : 3
3	In a group there are four boys to every 2 girls. What is the ratio of boys to girls in simplest form?	a	4 : 2	b	2 : 4	c	1 : 2	d	2 : 1
4	These ratios are equivalent. What is the missing number? 8 : 64 : 16	a	2	b	4	c	32	d	128
5	These ratios are equivalent. What is the missing number? : 16 15 : 48	a	5	b	3	c	45	d	240
6	What ratio is equivalent to 9 : 12?	a	12 : 16	b	12 : 15	c	8 : 11	d	None